REMARKS

The Applicants have filed the present Response in reply to the outstanding Official Action of June 21, 2005, and the Applicants believe the Response to be fully responsive to the Official Action for reasons set forth below in greater detail.

At the onset, Applicants would like to thank the Examiner for indicating that Claims 8-11 have allowable subject matter and would be allowed if rewritten in independent form including all of the limitations of the rejected base claim and any intervening claims.

Applicants would like to note that Claims 1 and 2 have been amended. Specifically, Claim 1 has been amended to recite, in part, that "each of said plurality of communication channels is capable of transmitting and receiving different types of communications from the other of said plurality of communication channels, where each type of communications has different bit rates, QoS (Quality of Service) and priorities which are caused by said different types of communications." Claim 2 has been amended to recite, in part, that "the assignment of subcarrier groups to the respective communication channels is adaptively performed based upon said priorities, bit rates and QoS (Quality of Service) for each of said plurality of communication channels." No new matter has been added by the above-identified amendments. For example, support therefor can be found on pages 12-17.

In the outstanding Official Action, the Examiner rejected Claims 1, 2, and 5 under 35 U.S.C. § 102(e) as being anticipated by Ring, United States Patent No. 6,430,148.

The Examiner avers that Ring teaches an OFDM circuit having a plurality of subcarriers for communication wherein the plurality of subcarriers are divided into groups and each group is assigned one group per channel. Applicants respectfully submit that Claims 1, 2 and 5 are patentably distinct from Ring for at least the following reasons.

Ring teaches a multi-directional orthogonal frequency division modulation (OFDM) communication system, wherein an uplink channel is provided by a first group of the OFDM sub-channels (subcarriers), and a downlink channel is provided by a second group of the OFDM sub-channels (subcarriers). A first group N of the M subcarriers is allocated for the downlink channel (i.e., for communication from the transmitter 18a to the receiver 20b), and a second group N of the M subcarriers is allocated for the uplink channel (i.e., for communication from the transmitter 18b to the receiver 20a). The number of sub-channels allocated to each group is controlled dynamically in response to demand for channel capacity. For example, in asymmetrical duplex operation (i.e., where one channel has a greater capacity than the other), a greater number of subcarriers may be allocated to one channel than to the other, as illustrated in FIG. 6. The capacities may be variable by allocating subcarriers individually; the capacities may be "selectable" by selecting one of a plurality of pre-defined subcarrier allocations. However, the reference solely teaches using **one type of communication in one OFDM line**. Additionally, the reference does not mention QoS, bit rates or priorities.

However, Ring fails to teach that each of said plurality of communication channels is capable of transmitting and receiving different types of communications from the other of said plurality of communication channels, where each type of communications has different bit rates,

QoS (Quality of Service), and priorities which are caused by said different types of communications, as specifically recited in Claim 1, as amended.

In a disclosed embodiment of the invention, the specification describes that the OFDM is primarily intended to transmit a plurality of communication channels with different bit rates and QoS via one OFDM line. See Abstract (To provide an orthogonal frequency division multiplex modem circuit which can multiplex signals, whose bit rates and QoS are different from one another and can transmit the signals via one OFDM line.)

Additionally, the sub-channel is not divided in accordance with uplink and downlink in the present invention. The number of sub-channels and a kind of modulation is assigned to each of the communication channels, which are different from each other in accordance with its QoS. For example, there is a different channel for ground-wave digital broadcasting, a digital radio or mobile telephone, and each has a different QoS associated with the type of communication.

Accordingly, Applicants submit that Claims 1, 2, and 5 are patentably distinct from the reference as the reference fails to teach or suggest each and every limitation of the claims.

Additionally, Applicants submit that Claim 2 is further patentably distinct from Ring for at least the following additional reasons.

Ring fails to teach the limitation of "wherein the assignment of subcarrier groups to the respective communication channels is adaptively performed based upon said priorities, bit rates

and QoS (Quality of Service) for each of said plurality of communication channels", as specifically recited in the claim.

In a disclosed embodiment, the specification describes that the present invention adaptively determines the **assignment of subcarriers** and modulation systems **according to the priorities, bit rates, and QoS of communication channels.** See page 12. See also page 9 ("an adequate modulation system and the number of subcarriers to be assigned can be determined from the bit rate and QoS, and the symbol rates of all subcarriers can be set to the same rate, 15 kHz.").

In stark contrast, in Ring, the assignment of subcarriers is solely based upon volume, i.e., demand for capacity. "The master control circuit 24a is operable to re-allocate the channel capacities adaptively to improve communication efficiency in each direction, such that the relative capacities of the uplink and downlink channels matches the demand in either direction pro-rata." See Col. 8, lines 40-49. In fact, Ring does not even mention QoS, bit rate and priority.

Accordingly, Applicants respectfully submit that Claim 2 is patentably distinct from Ring.

With respect to Claim 5, Ring does not teach the limitation of "wherein all subcarriers are assigned to a single channel as required, while communication of other channels is stopped", as specifically claimed. The paragraphs cited by the Examiner do not support his conclusion.

Specifically, Ring states,

> With this aspect of the invention, the efficiency of multidirection communication can be improved significantly by enabling redundant capacity in one channel to be used to increase the capacity of another channel when demand for capacity in that other channel is high. For example, in times of heavy capacity demand in the first channel, the capacity of the first channel relative to the second channel can be increased by allocating more sub-channels to the first channel than to the second. Likewise, in times of heavy demand in the second channel, the capacity of the second channel can be increased relative to the first by allocating (or re-allocating) a greater number of sub-channels to the second channel.
>
> Preferably, the capacity is dependent on the number of sub-channels allocated to the channel, the capacity increasing with a greater number of available sub-channels.
>
> The determination of capacity demand for each channel can be made in a number of ways, for example, by monitoring the whether the "live" traffic in each channel matches the current channel capacity, or by monitoring the size of input buffer files for data awaiting transmission to each channel.

See Col. 2, lines 8-28.

At best, this teaches that the number of subcarriers is allocated based upon the demand, i.e., increased or decreased. However, this is not a teaching that "all subcarriers are assigned to a single channel" and that the other channel is stopped. In contract, in a disclosed embodiment, the orthogonal frequency division multiplex modem circuit assigns the number of subcarriers to a channel based upon the different bit rates and QoS and priority. It is possible that only one communication channel can be passed preferentially.

For example, when it is necessary to relay digital Hi-Vision TV broadcasting, it becomes necessary to assign all subcarriers to this. In such a case, the other communication channels with lower priorities are temporarily stopped and all subcarriers are used for the one preference channel.

Accordingly, since Ring fails to teach or suggest each and every limitation of Claim 5, Applicants submit that the claim is patentably distinct from the reference.

The Examiner also rejected Claims 3 and 6 under 35 U.S.C § 103(a) as being unpatentable over Ring in view of Yonge III, et al., United States Patent No. 6,442,129 (hereinafter "Yonge")

Applicants disagree with the Examiner's rejection and traverse with at least the following analysis. First, the claims are patentable based upon their dependency from Claim 1, whether directly or indirectly. Additionally, Applicants respectfully submit that the hypothetically combined references fail to teach that the modulation system given to each of the subcarrier groups is changed according to QoS (Quality of Service) needed for a corresponding communication channel.

Yonge teaches that the modulation type is assigned based upon the data channel condition. This is not the system variable. Specifically, in Yonge, the modulation type is determined based upon noise values in the communication channel, and whether such noise values exceed several thresholds. The reference discloses criteria for each modulation type. See Table 1. The modulation type is selected based upon whether the channel meets the required criteria for each type, and if more than one modulation type is good, the system selects the one with the highest bit rate. If no modulation type is good, the system will transmit using a robust mode instead of a standard mode.

In contrast, the claimed invention uses the QoS to determine the modulation type. The QoS is determined based upon the communication type and not just a channel condition. The

In contrast, the claimed invention uses the QoS to determine the modulation type. The QoS is determined based upon the communication type and not just a channel condition. The plural kinds of communication signals have different bit rates respectively, and their necessary transmission quality (QoS: Quality of Service) are different according to informational types. For example, there are various transmission rates (for example, 28.8 kbps, 1.44 Mbps, and 10 Mbps) in data communication, and an error rate not higher than **10E-6 is required**. On the other hand, in speech communication such as a telephone, a transmission rate is 13 kbps or the like, and the **error rate of 10E-3 is** regarded as sufficient quality. Therefore, based upon a required QoS or error rate, the modulation type will be selected. Accordingly, we believe that Claims 3 and 6 are patentably distinct since the references fail to teach each and every limitation of the claims.

Accordingly, since Ring fails to teach or suggest each and every limitation of Claims 3 and 6, Applicants submit that the claims are patentably distinct from the reference.

With respect to Claim 7, the Examiner rejects the claim based upon a combination of Ring, Sakoda and Manson. This rejection is technically defective as Sakoda was not used in the rejection of Claim 3, Yonge was used instead. However, Applicants believe that in a future non-final Official Action, the Examiner might reject Claim 7 in view of Ring, Yonge and Manson as the Examiner admitted that Yonge was needed for the rejection of Claim 3.

Nevertheless, Applicants respectfully disagree with the Examiner's rejection as the hypothetically combined references fail to teach the limitation of "wherein peak values of modulation symbols are determined so **that transmission power of the respective subcarriers becomes the same irrespective of the modulation systems**", as specifically recited in the claim.

systems differ. The present invention makes the mean signal power of all subcarriers uniform by adjusting peak values of symbols. This means is a determination of the peak values. The references do not teach that the transmission power of the subcarriers is the same irrespective of the modulation systems. Accordingly, the claim is patentably distinct from the cited references.

With respect to Claim 4, Applicants respectfully disagree with the Examiner's rejection of the claim under 35 U.S.C § 103(a). Sakoda does not teach that a means for randomizing alignment of the respective subcarriers on a frequency axis is included in a transmitting side, and means for de-randomizing a signal where the alignment is randomized is included in a receiving side. The subcarriers on which high priority data is superimposed and the subcarriers on which low priority data is superimposed are positioned alternately to be transmitted. See Abstract. This calculated transmission method can hardly be considered "random". This is a deliberate attempt to organize the high priority transmission with the lower priority transmission. In fact, Sakoda does not even use a randomizer to accomplish the disclosed function.

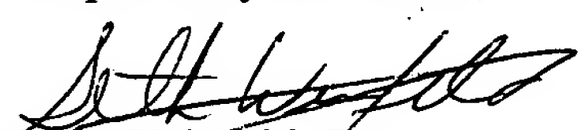
In contrast, Figure 4 depicts that a randomizer is used to "randomly" align the respective subcarriers on a frequency axis. A corresponding de-randomizer is used on the receiving side.

Accordingly, Claim 4 is patentably distinct from the cited references.

For all the foregoing reasons, the Applicants respectfully request the Examiner to withdraw the rejections of Claims 1, 2 and 5 pursuant to 35 U.S.C. § 102(e). Furthermore, the Applicants respectfully request the Examiner to withdraw the rejections of Claims 3, 4, 6-11 pursuant to 35 U.S.C. § 103(a).

In conclusion, the Applicants believe that the above-identified application is in condition for allowance and henceforth respectfully solicits the Examiner to allow the application. If the Examiner believes a telephone conference might expedite the allowance of this application, the Applicants respectfully request that the Examiner call the undersigned, Applicants' attorney, at the following telephone number: (516) 742-4343.

Respectfully submitted,



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